STUDENTS' TASK SOLVING EFFICIENCY ON AN ONLINE MATHEMATICS TEST

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This research investigated the possibilities of online assessment of 2nd grade students. The aims were to analyze student achievements and times spent on solving the tasks of a mathematics test, and to explore the effect of solving examples, task type and task position on task response times.

Computer-based assessment proved to be applicable for primary school students as well (*Csapó* et al., 2014). It makes possible to assess students' effectiveness and efficiency in task solving, where efficiency means the best achievement with the least waste of time (Williamson et al., 2006). However, tasks should be rather closed than open-ended, and, in the case of open-ended questions, short answers are preferred. Student achievements can be influenced by task types and by their personal skills that are necessary to give the answers (Bennett et al., 2008).

For the online assessment of mathematics achievements of 2nd graders, a test containing 9 tasks (48 items) was developed. The tasks were previously tested with a paper-and-pencil version, in the framework of another project. Two introductory, simple, non-mathematical example tasks were inserted at the beginning of the test.

Data were collected in volunteering schools, and the sample comprised altogether 4,738 2nd grade students. Tasks were administered using the eDia online assessment platform, which stored both item responses and task solving times. In addition to these variables, an indicator of 'student efficiency' was computed for each task.

In the analysis, our hypotheses were: (1) task solving time depends on task difficulty; (2) studying the task examples results in faster task solving on the first tasks of the test; and (3) student efficiency on a task depends on the task type and on the task's position in the test.

The average student achievement was similar, while the average test-taking time was shorter than for the paper-and-pencil version. A significant correlation was found between test taking time and test achievement ($p<0.01$), and, on most tasks, between task solving times and task achievements as well. But the hypothesized effect of task difficulty on task solving time and the positive effect of solving the example tasks could not be verified.

Student efficiency was in significant correlation with the achievement and with the task solving time, too ($p<0.01$ for each task). Our results verified the effect of task type on student efficiency. Students were more efficient when solving closed tasks than on open ended ones ($p<0.001$). Student efficiency depends on task position, it was significantly lower on the first task than on the following ones ($p<0.001$).

We can conclude that the online testing of mathematics knowledge can be effective. The results of the online test were similar to those of the paper-and-pencil version, but it took less time to complete. The investigation on the factors influencing student efficiency can contribute to the better understanding of the task solving process.

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